

REMARKS

At the outset, the Applicant wishes to express his appreciation to Patent Examiner Alan Diamond for the many courtesies extended to the undersigned attorney during the Personal Interview on December 16, 2004, at the U.S.P.T.O. The substance of this Personal Interview is set forth in the Examiner Interview Summary and in this Response.

Enclosed is an Associate Power of Attorney appointing the undersigned attorney to act in this patent application.

On Page 2 of the Office Action, the Patent Examiner acknowledged receipt of the certified English translation of Japanese foreign priority document 2-121133. However, the copies of the certified English translations for Japanese foreign priority documents 1-341244, 1-341245, and 2-105772 have not been received. Therefore, in response to the request of the Patent Examiner, copies of the certified English translations for Japanese foreign priority documents 1-341244, 1-341245, and 2-105772 are now filed herewith and are made of record in the instant application.

Reconsideration and withdrawal are respectfully requested for the rejection of Claims 1-3 and 7 under 35 U.S.C. 103(a) as being unpatentable over *Williamitis* (U.S. Patent 2,807,155) in view of *Midgley, Jr. et al* (Re. 19,265) and *Slayton* (U.S. Patent 4,178,765).

Reconsideration and withdrawal are respectfully requested for the rejection of Claims 4,6,8,9,11,12,16,17 and 21 under 35 U.S.C. 103(a) as being unpatentable over *Williamitis* in view of *Midgley, Jr. et al.* and *Slayton* as applied to claims 1-3 and 7 above, and further in view of *Kohashi et al.* (JP 62-292895).

Reconsideration and withdrawal are respectfully requested for the rejection of claims 5,10, 13-15, 18-20 and 22 under 35 U.S.C. 103(a) as being unpatentable over *Williamitis* in view of *Midgley, Jr. et al.* and *Slayton*, and further in view of JP 55-155093.

During the Personal Interview, there was a discussion of Table 1 on page 19 of the present Specification. It was respectfully pointed out that Example 1 and Comparative Examples 1 and 2 compare mixed tetra esters of the invention with 1:1 mixed acid ratio with prior art mono esters prepared with an individual carboxylic acid. The 1:1 ratio mixed esters had lower pour points of -45°C and clearly distinguish over the art of record. Claim 3 recites this 1:1 molar ratio of the two claimed carboxylic acids. Applicant discussed providing additional results using 1:3 and 3:1 ratios of the two acids to make the claimed tetra esters. Testing would be the base oil alone (i.e., no epoxy additives), and results should be convincing and in Rule 132 form. The Patent Examiner stated that if the results are not convincing, the Rule 132 declaration will not be

entered. Applicant would have to file an RCE.

The Patent Examiner noted that prosecution had previously been suspended in this case, and that he would have to check if any other references have become available. During the Personal Interview, International Application *PCT/US90/02069* published on November 1, 1990, under Number *WO90/12849*, was briefly discussed. It was agreed that this publication is not prior art against the present patent application.

From Table 1 in the present Specification, the comparative test results were based upon for comparison, the ester of pentaerithritol with 2-ethylhexanoic acid (Comparative Examples 1 and 2), and the ester of pentaerithritol with 3,5,5-trimethylhexanoic acid (Comparative Examples 3 and 4). These esters were evaluated for their performances in the same manner as in Examples 1-2. The results thus obtained are also indicated in Table 1 of the present Specification.

Based upon this Personal Interview, a comparative testing program was conducted by Mr. Kazuo Tagawa, who is employed by the Assignee, Nippon Oil Co., Ltd. The results of the testing are to substantiate new and unexpected results for the mixed esters, which are included in the refrigerator oils of the present invention, based upon molar ratios of 1:3 and 3:1 for two carboxylic acids in

which the first carboxylic acid is 2-ethylhexanoic acid and the second carboxylic acid is 3,5,5-trimethylhexanoic acid. Hence, further Comparative Tests were conducted as follows and are presented in the enclosed Declaration of Mr. Tagawa.

The refrigerator oils (Test Oil Nos. 1 and 2) which are included in the present invention each of which has a composition indicated in the following Table A, were prepared and then evaluated for their performances that are their insulating property, hygroscopicity and thermal and chemical stability by the same test methods as described in the present specification on pages 16-18. The Comparative Tests were carried out with the base oil alone without any epoxy additive. The results thus obtained are indicated in Table A of the Tagawa Declaration.

As is apparent from the results indicated in Table A of the Tagawa Declaration, the refrigerator oils (Test Oil Nos. 1 and 2) of the present invention contain molar ratios of 1:3 and 3:1 for the two carboxylic acids. The first carboxylic acid is 2-ethylhexanoic acid (C8) and the second carboxylic acid is 3,5,5-trimethylhexanoic acid (C9). The refrigerator oils of the present invention are excellent in pour point temperatures, which exhibit not higher than -10°C , as well as in any of insulating property, hygroscopicity and thermal and chemical stability, like in Examples 1 and 2 according to the present invention indicated in Table 1 of the present

specification on page 19.

The pour point temperature determined from the testing is -35°C for the C8 to C9 in a 1 mol:3 mol ratio, and is -45°C for the C8 to C9 in a 3 mol:1 mol ratio. This is clearly unexpected and is definitely superior to the pour point temperatures for the prior art esters of 0°C or 10°C shown in Table 1 on page 19 of the present Specification. No epoxy compound was utilized during the testing program.

The *Williamitis* (U.S. Patent No. 2,807,155) in column 1, in lines 30 to 36, discloses providing a working fluid for a refrigeration apparatus which includes a lubricant comprising an organic acid ester of pentaerythritol and a refrigerant wherein the refrigerant is completely miscible with the ester and is capable of existing in liquid and gaseous phases within the operating temperature range of the refrigeration apparatus.

Williamitis also teaches a refrigeration apparatus which includes a fluoro halo substituted aliphatic hydrocarbon refrigerant capable of being in liquid and gaseous phases within the operating temperature range of the refrigeration apparatus and a lubricant comprising an organic acid ester of pentaerythritol.

It also provides a refrigeration apparatus which includes a

motor compressor, a condenser, an expansion device and evaporator in fluid flow relationship and a working fluid which includes a fluoro halo substituted aliphatic hydrocarbon refrigerant and a lubricant comprising an organic acid ester of pentaerythritol.

Williamitis, in column 2, in lines 23 to 29, discloses that the refrigerant used in the refrigeration apparatus comprises a fluoro halo derivative of an aliphatic hydrocarbon of the character disclosed in the patent to *Midgeley et al.*, Re. 19, 265, reissued August 7, 1934, as, for example, trichlorofluoromethane (Freon 11), dichlorodifluoromethane (Freon 12) and particularly difluoromonochloromethane (Freon 22).

Williamitis in column 3, in lines 20 to 35, discloses that the pentaerythritol compounds may be produced by reacting acetaldehyde with formaldehyde in an alkaline medium under rigorously controlled conditions as is well described in chemical literature. The esters of *Williamitis* may be formed by reacting the pentaerythritol compounds with organic acids having the desired hydrocarbon structures. Thus acids such as n-butyric, n-valeric and caprylic may be used to produce straight chained aliphatic R groups and acids such as isobutyric acid may be used to produce branched chain R groups. Similarly aromatic acids such as benzoic acid and paratoluic acid may be used to produce aryl R groups and acids such as phenylacetic acid may be used to produce aromatic radical

substituted alkyl R groups. The acids used to produce these prior art esters are those having no reactive groups other than the carboxyl and preferably those having a single carboxyl group.

Williamitis in column 4, in lines 20 to 23, or in lines 49 to 52, discloses that the pentaerythritol ester used in the above tests involves mono esters formed by reacting aliphatic organic acids having an average carbon chain of about 7.

Thus, *Williamitis* and *Midgley* both fail to teach or to suggest the claimed fluid composition for a refrigerator, which comprises a chlorine-free fluorocarbon refrigerant and a refrigerator oil, said refrigerator oil consisting essentially of as a major component a tetraester of pentaerythritol with both 2-ethylhexanoic acid and 3,5,5-trimethylhexanoic acid, said refrigerator oil exhibiting a pour point not higher than -10°C. These references teach monoesters and not the claimed tetraesters.

The *Slayton* (U.S. Patent No. 4,178,765) in column 2, in lines 1 to 20, discloses that a refrigeration system is provided including in series a condenser, an evaporator, an expansion device arranged intermediate the condenser and evaporator dividing the system into high and low pressure portions. A hermetic compressor having a sump portion containing a supply of lubricating oil for the compressor. A reservoir connected in communication with the system. The

reservoir contains a material having higher solubility for refrigerant relative to the lubricating oil. The volume of the material is an amount sufficient to absorb most of the refrigerant which can exist as a liquid in the system. There is a means for causing liquid refrigerant when present to collect at a predetermined portion of the sealed system. Liquid refrigerant is prevented from flowing into the compressor cylinder during initial start up.

Slayton from column 3, lines 55 to 68, and from column 4, lines 1 to 6, discloses that means are provided in the reservoir that will cause the condensed refrigerant in the system to migrate by gaseous transfer into the reservoir instead of into the compressor sump when the system is inactive.

To accomplish this a material is arranged in the reservoir that essentially has a higher solubility with refrigerant relative to the lubricating oil. The refrigerant in the system has a greater solubility in the material than it has with the compressor lubricating oil.

Materials used in carrying out the *Slayton* process were an alkylbenzene liquid and a polyester liquid having such chemical compositions as to remain liquids at all ambient operating temperatures encountered by the reservoir. Typical examples are an

alkylbenzene with a viscosity of 150 SUS at 100°F., pour point of -50°F., specific gravity of 0.872, and a molecular weight of 320. A polyester fluid used in the present invention was a pentaerythritol ester with a viscosity of 150 SUS at 100°F. And a pour point of -50°F.

Thus, *Slayton* fails to teach or to suggest the claimed fluid composition for a refrigerator, which comprises a chlorine-free fluorocarbon refrigerant and a refrigerator oil, said refrigerator oil consisting essentially of as a major component a tetraester of pentaerythritol with both 2-ethylhexanoic acid and 3,5,5-trimethylhexanoic acid said refrigerator oil exhibiting a pour point not higher than -10°C.

The *Japanese Patent No. J62-292895* teaches a refrigerating machine oil comprising a polyvalent alcohol ester or mixture of a polyvalent alcohol ester and a mineral oil or a synthetic oil, to which mixture has been added 0.05-10 wt.% of a glycidyl ester of a straight chain unsaturated fatty acid with a carbon number of 14-18 or a straight chain or a side-chain saturated fatty acid with a carbon number of 8-18.

The *Japanese Patent No. JP 55155093A* teaches a refrigerator lubricant which contains 0.005-5 wt.% trimethyl phosphate in neopentyl polyol ester. Preferred as a neopentyl polyol ester is

an ester of natural or synthetic fatty acid e.g. caprylic acid, lauric acid, palmitric acid, stearic acid, or 2-ethylhexanoic acid, or iso-nonanoic acid. Preferred polyols are neopentyl glycol, trimethylol ethane, trimethylol propane and pentaerythritol.

Thus, both Japanese patents fail to teach or to suggest the claimed fluid composition for a refrigerator.

In summary, the test results in the present Specification in Table 1 establish that the 1:1 molar ratio of C8:C9 in the claimed tetraester provides unexpectedly superior results (-45°C pour point). The Comparative Test results in the Tagawa Declaration in Table A establish that the 1:3 molar ratio of C8:C9 and that the 3:1 molar ratio of C8:C9 in the claimed tetraester again provides unexpectedly superior results (-35°C or -45°C pour point). These unexpectedly superior results are an exceedingly strong indication of the nonobviousness of the claimed invention.


In conclusion, the present invention is believed to be patentable over all the prior art references applied by the Patent Examiner under 35 U.S.C. 103. A prompt notification of allowability

is respectfully requested.

Respectfully submitted,

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Enclosures: 1. Tagawa Declaration
 2. Copies of 3 Certified English translations
 3. Power of Attorney
 4. Notice of Appeal (in duplicate) with
 Extension of Time
 5. Check in the amount of \$1,520.00

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on February 25, 2005.


Ingrid Mittendorf